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(71) Applicant
Tien-Song Chang,
2 Ground Floor, Lane 221, Jin-Ping Rd, Chung Ho City,
Taipei Hsien, Taiwan

(72) Inventor
Tien-Song Chang

(74) Agent and/or Address for Service
Langner Parry,
52–54 High Holborn, London WC1V 6RR

(54) Electric water heater

(57) An electric water heater comprises two nested electrodes 4,5, a pressurized air source 11 with means 13 to synchronize the control the inflow of source water and pressurized air and valve means controlling the flow of heated water to a blending chamber prior to exit to an external hot water reservoir 14. Easily adaptable for use in various locales having varying water qualities, the heater is also able to maintain a proper water temperature and can immediately discharge the water between the electrodes when required. In a preferred embodiment, the electrodes on the heater are substantially inverted frustro-conical in shape. Means 8 are also provided for adjusting the distance between the electrodes when desired.

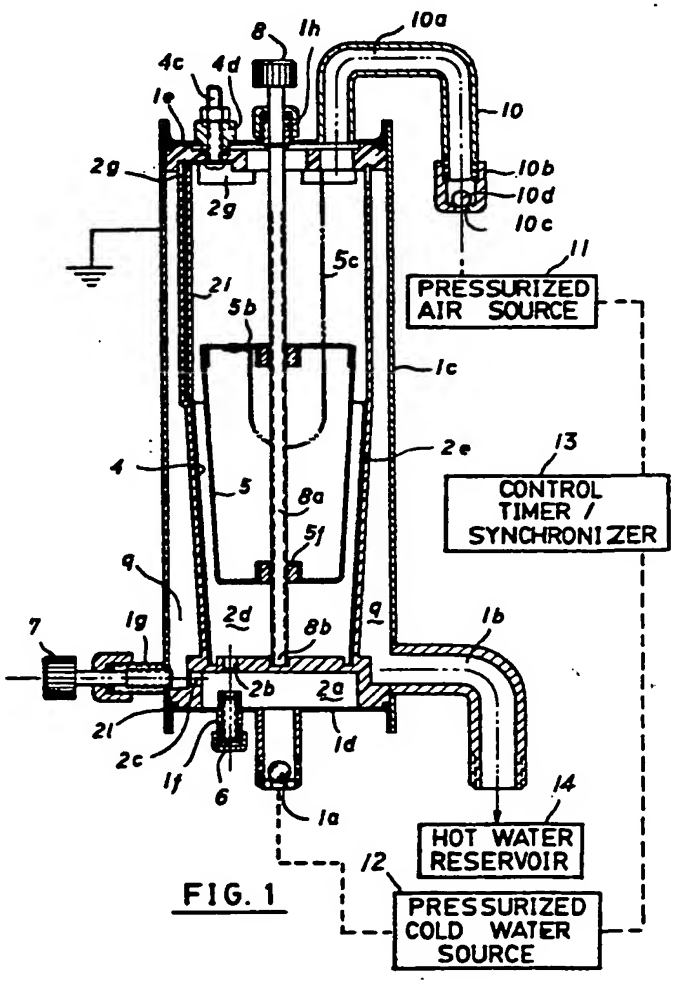

FIG. 1

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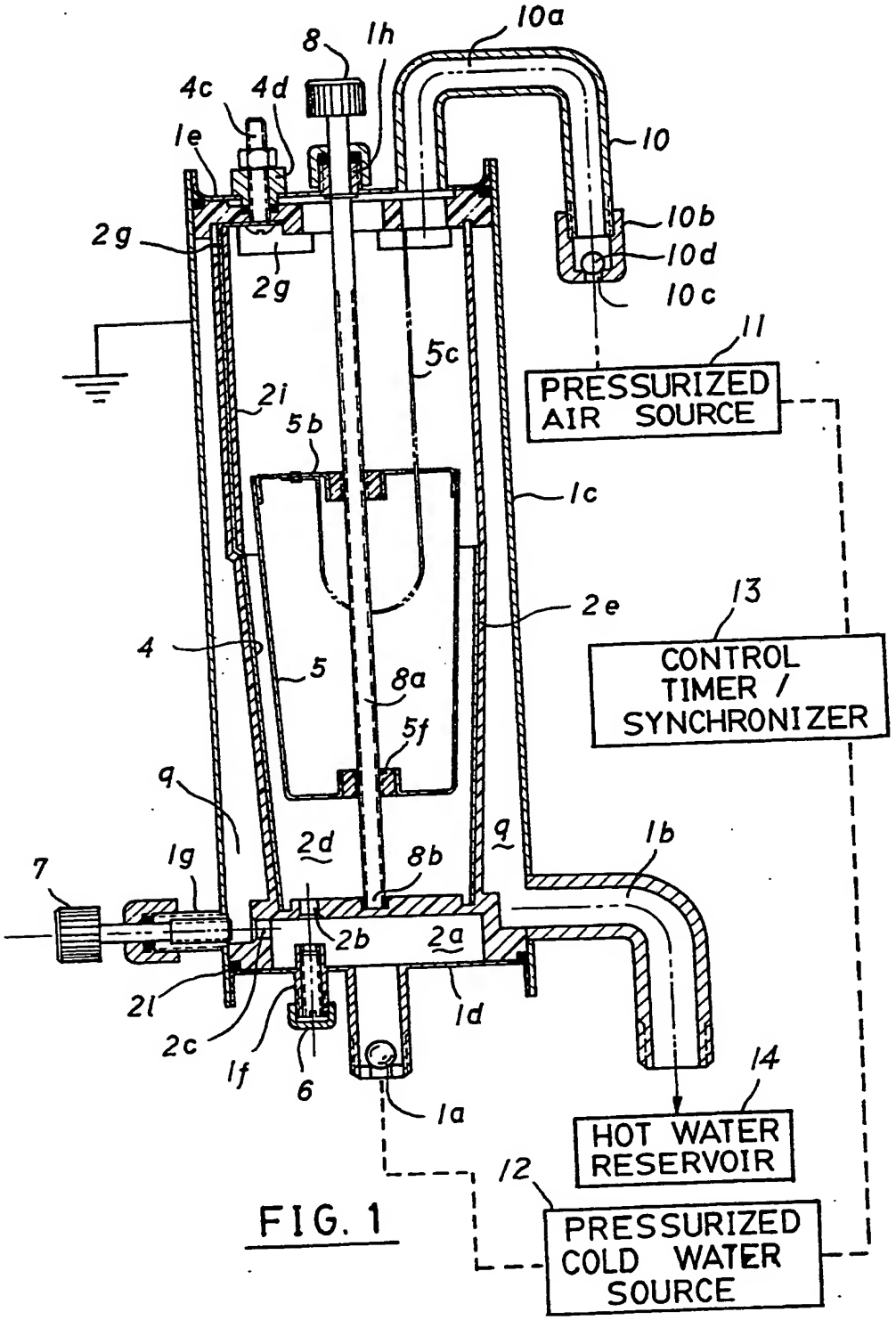

FIG. 1

SPECIFICATION

Electric water heater

FIELD OF THE INVENTION:

The present invention relates to an electric water heater, and in particular, to an electric water heater wherein the water is heated by a pair of electrodes, whereby water is supplied in a fixed quantity and at a fixed temperature.

BACKGROUND OF THE INVENTION

The design of conventional water heaters presently utilize an electric heating wire which is encased in an insulated jacket. As an alternative, the prior researchers have experimented with a design which utilizes spaced electrodes for heating the water by a current passing between the electrodes. While practical experiments have shown the power rate of heaters or the type utilizing an electric heating electrode design to be higher than that of the conventional heaters, these electrode type heaters of the prior art all have several deficiencies which render them unreliable and severely limit their use.

Among the deficiencies of the electrode type heaters of the prior art are: (1) an inability to adapt to the varying water quality of different locales caused by salts and minerals in the water which affect the magnitude of the electric power that passes through the electrodes; (2) an inability to maintain a constant proper water temperature due to water flow; and (3) an inability to immediately discharge the water between the electrodes when the water inlet is closed which causes the temperature of such water to rise very quickly.

Thus it will be appreciated that there remains a need for a water heater of the type utilizing an electric heating electrode design which alleviates the deficiencies and disadvantages of the prior art and is of a design that: (1) is easily adaptable for use in various locales having varying water qualities; (2) can maintain a proper water temperature; and (3) can immediately discharge the water between the electrodes when the water inlet is closed.

SUMMARY OF THE INVENTION

Accordingly, it is the primary objective of the present invention to alleviate the disadvantages and deficiencies of the prior art by providing an electric water heater of the type utilizing an electric heating electrode design which is readily adaptable to use in various locales having varying water qualities; maintains a proper water temperature; and can immediately discharge the water between the electrodes when the water inlet is closed.

It is another object of the present invention to employ electric power as the main energy for the hot water cyclic system.

It is another primary object of the present invention to provide a heater with a higher efficiency.

Another object of the present invention is to provide a water heater to supply a water flow at a substantially stable temperature without any spontaneous erratic intermittent colder and hotter water supply.

A further object of the present invention is to provide a hot waterheater adaptable to the running water quality at various places, thereby allowing the electric power used to operate the heater to maintain a stable state.

Still a further object of the present invention is to provide a hot water cyclic system with a stable water temperature, thereby achieving the economic and safe characteristics desired.

In accordance with the teachings of the present invention, an electric water heater is provided with a hollow outer housing. A water heating chamber is positioned within the housing, the area therebetween defining a blending chamber. An external pressurized cold water supply source and the heating chamber. A first valve means controls the flow of water between the heating chamber and the water source. First and second electrodes are positioned within the heating chamber, nested with respect to each other, and at least partially disposed in the water in the heating chamber. Means are provided for passing a current to the electrodes, whereby the water in the heating chamber is heated to a predetermined temperature. A second valve means controls the flow of heated water between the heating chamber and the blending chamber. An external hot hot water reservoir is provided, whereby the heated water is stored for use. A second conduit means provides for fluid communication between the blending chamber and the hot water reservoir. A pressurized air source having a valve means forces the heated water under pressure from the heating chamber through the second valve means, the blending chamber, and the second conduit means, respectively, and into the external hot water reservoir. A means for synchronizing the operation of the pressurized cold water source and the pressurized air source is also provided, whereby the hot water reservoir is maintained at a substantially constant level for use.

In a preferred embodiment, the electrodes are substantially inverted frustro-conical in shape. The first electrode has a skirt and a base. The second electrode has a skirt but no base.

In another preferred embodiment of the present invention a means for adjusting the distance between the first and second electrodes is provided. This adjusting means includes an adjustable screw rod positioned on a vertical axis and inserted through an aperture formed in the top of the housing. The first electrode has a hub, and a threaded bushing is press fitted into the hub for receiving the adjustable screw rod, whereby rotation of the screw rod

adjusts the distance between the first and second electrodes, thereby increasing or decreasing the temperature of the water within the heating chamber. Additionally, the top of the housing is recessed to receive an inner housing.

In yet another preferred embodiment of the present invention, the electrodes are comprised of a non-oxidizable metal.

In accordance with the further teachings of the present invention, an electric water heater is provided with a hollow outer housing having a base, continuous sidewalls and a top. An internal housing is positioned within the outer housing, the area therebetween defining a blending chamber. The internal housing has a transverse wall separating the internal housing into an upper water heating chamber and a lower water receiving chamber disposed above the base of the outer housing. An external pressurized cold water supply source is provided. A first conduit means, having a one-way ball-check valve means, is connected between the external water supply source and the water receiving chamber for fluid communication therebetween. A first valve means controls fluid communication between the water receiving chamber and the water heating chamber. A pair of electrodes are positioned within the water heating chamber. The electrodes are substantially nested with respect to each other, and are at least partially disposed in the water in the heating chamber. Means is provided for passing a current to the electrodes, whereby a portion of water localized therebetween is heated to a predetermined temperature. A second valve means controls communication between the water receiving chamber and the blending chamber, whereby water flows from the water receiving chamber to the blending chamber. An external hot water reservoir is also provided, whereby the heated water is stored for use. A second conduit means allows fluid communication between the blending chamber, through the first valve means, water receiving chamber, second valve means, blending chamber, and second conduit means, respectively, and into the hot water reservoir. Means for synchronizing the operation og this last-named means and the pressurized cold water source is provided, whereby the hot water reservoir is maintained at a substantially constant level for use.

In accordance with the yet further teachings of the present invention, an electric water heater is provided having a hollow outer housing. The outer housing is cylindrical in shape and has a base, continuous sidewall, and upper cover. An internal hous ing is positioned within the outer housing, the area therebetween defining a blending chamber. The internal housing has a transverse wall separating the internal housing into an upper water heating chamber and a lower water receiving chamber disposed above the base of the outer housing. The heating chamber is provided with a lid. An external pressurized cold water supply source is provided. A first conduit means, having a one-way ball-check valve means, is connected between the external water supply source and the water receiving chamber, for fluid communication therebetween. A first valve means, having a first valve aperture, is positioned in the transverse wall for fluid communication between the water receiving chamber and the heating chamber. This first valve means allows cold water to flow from the heating chamber. A first valve adjustment means provides for adjusting the water flow through the first valve means. An upper electrode is positioned within the heating chamber and is at least partially disposed in the water therein. This upper electrode is substantially inverted frustro-conical in shape, having a skirt, a base, and an electrode lid. The upper electrode's base and electrode lid each, respectively, has a hub and a threaded bushing, press fitted into the hub. A lower electrode is positioned within the water heating chamber, nested substantially parallel with respect to the upper electrode, and is at least partially disposed in the water therein. This lower electrode is substantially inverted frustro-conical in shape and has a skirt. A first terminal having a first end and second end, respectively, is positioned between the upper cover and the upper electrode. In this position, the first end is in communication with, and secured to, the upper cover; and the second end is in communication with, and secured to, the first electrode. A second terminal having a first and a second end, respectively, is positioned between the upper cover; and the second electrode. In this position, the first end is in communication with, and secured to, the upper cover; and the second end is in communication with, and secured, to the second electrode. Means are provided for passing a current to the electrodes, whereby water in the heating chamber is heated to a predetermined temperature. An external hot water reservoir is also provided, whereby the heated water is stored for use. A second valve means, having a second valve aperature, is carried in the internal housing for fluid communication between the water receiving chamber and the blending chamber. This second valve means allows water flow from the water chamber to the blending chamber. A second valve adjustment means provides for adjusting the water flow through the second valve means. A second conduit means allows fluid communication between the blending chamber and the hot water reservoir, whereby heated water is carried from the blending chamber to the hot water reservoir. A pressurized air source, having a one-way ball-check valve, is provided. This air source pumps water from the water heating chamber through the first valve

means, the water receiving chamber, the second valve means, the blending chamber and the second conduit means, respectively, and into the hot water reservoir. A means is provided for synchronizing the operation of the pressurized cold water source and the pressurized air source, whereby the hot water reservoir is maintained at a substantially constant level for use.

These and other objects of the present invention will become apparent from a reading of the following specification taken in conjuction with the enclosed drawings.

BREIF DESCRIPTION OF THE DRAWINGS:

Figure 1 is a cross sectional view of the improved electric water heater of the present invention, the associated block diagram illustrating (schematically) the water flow and control of the heater.

Figure 2 corresponds substantially to Figure 1, but has the block diagram portion thereof deleted for ease of illustration, and shows the inner movable electrode in a raised position for a reduced heating effect.

Figure 3 is an exploded perspective view, with certain parts in sections of the improved electric water heater of Figure 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS:

The present invention includes an outer housing 1, an inner housing 2e, a lid 3, and two electrodes 4,5.

As shown in the attached drawings, in a preferred embodiment the outer housing 1 is comprised of a first conduit means serving as a water inlet 1a, a second conduit means serving as a water outlet 1b, a hollow cylindrical metal outer housing 1c, a base 1d and an upper cover 1e. The base 1d is provided with a water inlet 1a and an adjustment seat 1f to adjust the water quantity flowing into the heating chamber 2d and through the two electrodes 4,5. The hollow cylindrical metal outer housing 1c is provided with a water outlet 1b. The housing 1c is also provided with an adjustment seat 1g to adjust the water flow into the blending chamber 9, wherein the hot and cold water mix in a blended water flow at a proper temperature. The upper cover 1e is provided with an electric current adjustment seat 1h and two round holes 1i and 1j, which receive the terminals that pass the current to the two electrodes therein. Another round hole 1k is provided to receive an air pressure tube 10 (to be described hereinafter).

The inner housing 2e has a transverse wall 2 separating the inner housing 2e into two layers or portions. The lower portion constitutes a water receiving chamber 2a, and the hollow cylindrical upper portion constitutes a water heating chamber 2d. The water receiving chamber 2a has two outlets 2b, 2c. The outlet 2b allows the passage of water into the heating chamber 2d. An adjustment knob 6 controls the size of the outlet 2b to control the flow of water between the heating chamber 2d and the water receiving chamber 2a. This allows hot water from the heating chamber 2d to mix with cold water from the cold water supply source in the water receiving chamber 2a. The mixed water then flows out of the water outlet 2c and into the blending chamber 9. An adjustment knob 7 controls the size of the outlet 2c, which in turn controls the flow of water through the outlet 2c. The mixed water then flows out ofthe water blending chamber 9 through outlet 1b.

The hollow cylindrical inner housing 2e has an inner wall 2f positioned over the base 1d. A concave slot 2h is provided in the upper section on the inner wall 2f so that access to the internal workings of the heater is available. To avoid the interaction between the terminal 4a and another electrode 5, an insulation plate 2i is provided on the terminal 4a. A concave hole 2j is provided in the center over transverse wall 2 to receive the eleongated bolt of the adjustable screw rod 8a. Further, a concave slot 2k is provided on the outer perimeter on the bottom of the inner housing 2e to receive a plastic (rubber) pad 21 to avoid water leakage.

The lid 3 is made of an insulation material. Under the lid an annular concave slot 3a is provided to receive the hollow cylindrical inner housing 2e. Further, two round apertures 3b, 3c are also provided therein for the introduction of the power supply for the electrodes. Still further, an air vent is also provided therein. A concave slot 3e is provided in the outer ring on the upper side of the lid 3 so that a rubber (or plastic) pad 3f can be installed to seal off any possible water leakage. A round hole 3g is provided in the center of the lid 3 to allow the adjustable screw rod 8a to pass therethrough.

In the invention, the two electrodes 4, 5 are substantially inverted frustro-conical in shape. It is understood, however, that they may also be of an annular form. The electrode 4 has a guide plate or terminal 4a. An electric conductive screw 4c and a water stopper 4d are provided to secure the guide plate 4a to the lid 3.

The electrode 5 is provided with a shield cover 5b, a plate spring 5c which is electrically conductive, an electric conductive screw 5d and a water stopper 5e. The electrode 5 is in a tapered form with a larger upper part and a smaller lower part. Its inclined plane is parallel to the inclined plane of the other electrode 4. Thus as the distance between the electrodes 4 and 5 increases, due to the up-and-down movement of the electrode 5, the parallelism between the electrodes is still maintained.

In the preferred embodiment, the electrodes 4, 5 are substantially inverted fru stro-conical

in shape, and are substantially nested with respect to each other, one electrode being surrounded by the other electrode. The current between the electrodes is carried through the water between them, whereby the water is heated. The current at positions not disposed in the water is extremely small and almost tantamount to zero in the practical experimental measurements.

The adjustment knob 6 is provided on an adjustment seat 1f. By forward and backward movements (that is, clockwise and counterclockwise rotation), the knob 6 controls the size of the outlet 2b. The size of the outlet 2b controls the flow of water through inlet 2b to and from the heating chamber 2d as required.

The adjustment knob 7 is provided on the adjustment seat 1g of the outer housing 1c. By forward and backward movements, the knob 7 controls the size of the outlet 2c. By controlling the size of outlet 2c, the water in the water receiving chamber 2a enters the blending tank 9 at different flow speed and amount as required. In another embodiment, wherein the water receiving chamber 2a is elimnated, the size of outlet 2c can be used to control the flow and speed of water from inlet 1a which has been heated. The blended water in the blending chamber 9 then flows out of the water outlet 1b.

By proper coordination, the adjustment knobs 6 and 7 can be utilized to adjust a proper water temperature suitable for the people to take a bath, etc. When both the pressure and flow of the incoming water from the inlet 1a are stable, the temperature of the water flowing from outlet 1b remaining almost constant. The temperature changes at the start and upon completion of the usage are very short. This is due to the unique design of the electrodes of the present invention. On this respect the present invention represents an improvement cover the electric heating wires or gas heaters of conventional usage which are quite unstable at the initial heating and the residual heat stages. As a result, the adjustments involved with the present invention are simple, quick and stable.

The adjustable screw rod 8 comprises an elongated threaded bolt 8a. The one end of bolt 8a is received in the concave hole 2j of the transverse wall 2. When the screw rod 8 is turned, the threads of the bolt 8a interact with the threaded bushing 5f of the electrode 5 to move the electrode upward or downward. Because the plate spring 5c hinders the rotation of the electrode 5, the electrode 5 will move up or down thereby changing the current when the water quality is maintained stable. (According to the surveys and experiments made in this country, the water quality is quite stable). Such adjustments can be simply, directly and properly performed by the technician with a current meter to take the related measurements during the installation of such water heaters. Also a safe allowable tolerance can also be easily obtained during the design and manufacturing process.

An air pressure pipe 10 is installed on the top of the present invention, i.e. on the upper cover 1e. This pipe 10 carries air from a pressurized air source 11 and has a portion 10a carried by the top of the electric water heater. The pipe 10 is bent, a tail shield 10b is provided on its tail, and an opening 10c is provided. The material of the the tail shield 10b may be rubber. A one-way, ball-check valve 10d is also provided, so that when the water goes up and enters the air pressure pipe 10, the ball-check valve 10d chokes the opening 10c of the air pressure pipe 10, preventing water from entering therein so the water can never flow out from the air pressure pipe 10.

When the water from the cold water supply source 12 fills the heating chamber 2d so that no further water can enter therein, the control timer/synchronizer 13 activates the pressurized air source 11 which then sends pressurized air through the pipe 10 and into the heating chamber 2d. As a result, water is rapidly forced from the heating chamber 2d, through outlets 2b and 2c, the blending chamber 9 and the water outlet 1b, respectively, and into the hot water reservoir 14 where it is stored for use. When water is not present between the two electrodes 4, 5, the power supply is naturally cut off, i.e. no circuit is formed.

Preferably of the components of the heater, except the metal outer housing shell 1c, the two electrodes 4 and 5, and steel bead 10d (all of which have been grounded), can be made of insulation material such as molded plastic. The adjustable screw rod 8a can be also made of a metal and grounded.

As to its power supply, AC or DC can be easily used.

In summary, the improved electric water heater of the present invention constitutes an important contribution in the art. Employment of the electrodes according to the invention can accomplish an ideal hot water supplying apparatus with a greater efficiency than present conventional heaters of either the electric wire or electrode designs.

The heater can be easily adjusted during installation to adapt to varying water quality of different locales, thereafter maintaining a constant proper water temperature. The user will only need to turn on the faucet, whereby water of a stable temperature and quantity will be continuously supplied without concern for adjusting the water temperature. The water can be discharged immediately from between the electrodes, when the water inlet is closed, thereby maintaining the constant temperature of the water.

Obviously, many modifications may be made without departing from the basic spirit of the present invention. Accordingly, it will be ap-

preciated by those skilled in the art that within the scope of the appended claims, the invention may be practiced other than has been specifically described herein.

CLAIMS

1. An electric water heater comprised of:
a hollow outer housing;
a water heating chamber positioned within the housing,
the area therebetween defining a blending chamber;
an external pressurized cold water supply source;
a first conduit means for fluid communication between the external water supply source and the heating chamber;
a first valve means for controlling the flow of water between the heating chamber and the water source;
a first and a second electrode positioned within the heating chamber, nested with respect to each other the being at least partially disposed in the water in the heating chamber;
means for passing a current to said electrodes, whereby the water in the heating chamber is heated to a predetermined temperature;
a second valve means for controlling the flow of heated water between the heating chamber and the blending chamber;
an external hot water reservoir, whereby the heated water is stored for use;
a second conduit means for fluid communication between the blending chamber and the hot water reservoir;
a pressurized air source having a valve means, whereby the heated water is forced under pressure from the heating chamber through the second valve means, the blending chamber, and the second conduit means, respectively, and into the external hot water reservoir;
a means for synchronizing the operation of the pressurized cold water source and the pressurized air source, whereby the hot water reservoir is maintained at a constant level for use.

2. The device of claim 1, wherein the electrodes are substantially inverted frustro-conical in shape and wherein the first electrode has a skirt and a base and further wherein the second electrode has a skirt but no base.

3. The device of claim 1, wherin the electrodes are comprised of a non-oxidizable metal.

4. The device of claim 1, wherein the first valve means is comprised of a one-way ball-check valve having a first seated position, whereby water is prevented from flowing from the heating chamber to the water source, and a second unseated position, whereby water is permitted to flow from the water source to the heating chamber.

5. The device of claim 1, wherein means are provided for adjusting the distance between the electrodes, whereby temperature of the water within the heating chamber is controlled.

6. The device of claim 5, wherein the means for adjusting the distance between the first and second electrodes is comprised of:
the outer housing having a top provided with an aperture therein and further provided with a recessed portion wherein the inner housing is adaptably received;
an adjustable screw rod positioned on a vertical axis and inserted through the aperture of the top;
the first electrode being provided with a hub and a threaded bushing, press fitted into said hub for receiving the adjustable screw rod, whereby rotation of the screw rod adjusts the distance between the first and second electrodes increasing or decreasing the temperature of the water within the heating chamber.

7. The device of claim 6, wherein the means for adjusting the distance between the first and second electrodes is further comprised of a means for stabilizing the electrode, whereby rotation of the first electrode is prevented during rotation of the screw rod.

8. The device of claim 1, wherein the means for passing the current to the electrodes is comprised of:
the outer housing having a top;
a first termianl having a first end and second end, said first terminal being positioned between the top and the first electrode, wherein the first end is in communication with and is secured to the top and further wherein the second end is in communication with the first electrode;
a second terminal having a first and second ends, said second terminal being positioned between the top and the second electrode wherein the first end is in communication with, and is secured to, the top and further wherein the second end is in communication with the second electrode;
means for passing a current to said terminals, whereby said current is carried to the first and second electrodes for the heating of water therebetween.

9. An electric water heater comprising:
a hollow outer housing having a bse, continuous sidewalls and a top;
an internal housing positioned within the outer housing and defining therebetween a blending chamber, said internal housing having a transverse wall separating the internal housing into an upper water heating chamber and a lower water receiving chamber disposed above the base of the outer housing;
an external pressurized cold water supply source;
a first conduit means having a one-way ball-check valve means connected between the external water supply source and the water receiving chamber for fluid communication there-

between;

a first valve means for fluid communication between the water receiving chamber and the water heating chamber;

a pair of electrodes positioned within the water heating chamber, substantially nested with respect to each other, and being at least partially disposed in the water in the heating chamber;

means for passing a current to said electrodes, whereby a portion of water localized therebetween is heated to a predetermined temperature;

a second valve means for fluid communication between the water receiving chamber and the blending chamber, whereby water flows from the water receiving chamber to the blending chamber;

an external hot water reservoir, whereby the heated water is stored for use;

a second conduit means for fluid communication between the blending chamber and the hot water reservoir;

means for selectively forcing water under pressure from the heating chamber, through the first valve means, water receiving chamber, second valve means, blending chamber, and second conduit means, respectively, and into the hot water reservoir; and

means for synchronizing the operation of said last-named means and the pressurized cold water source, whereby the hot water reservoir is maintained at a substantially constant level for use.

10. The device of claim 9, wherein the pair of electrodes are comprised of an upper and a lower electrode, each being substantially inverted frustro-conical in shape, and wherein the upper electrode has a skirt and a base, and further wherein the lower electrode has a skirt, but no base.

11. The device of claim 9, wherein the electrodes are comprised of a non-oxidizable metal.

12. The device of claim 9, wherein means are provided for adjusting the distance between the electrodes, whereby the temperature of the water in the heating chamber is controlled.

13. The device of claim 12, wherein the means for adjusting the distance between the electrodes is comprised of;

the top of the outer housing having an aperture therein; the heating chamber having a top with an aperture therein;

the pair of electrodes being an upper electrode and a lower electrode, said upper electrode having a hub and a threaded bushing press fitted into said hub;

the transverse wall having a concave hub on that surface which faces the heating chamber; and

an adjustable screw rod positioned on a vertical axis, inserted through the aperture of the outer housing and the aperture of the heating chamber, respectively, threaded through the bushing of the upper electrode and adaptably piloted in the hub of the transverse wall, whereby rotating the screw rod adjusts thedistance between the upper and lower electrodes, thereby increasing or decreasing the temperature of the water within the heating chamber.

14. The device of claim 13, wherein the means for passing the current to the electrodes is comprised of;

a first terminal having a first end and a second end, said first terminal being positioned between the top of the heating chamber and the upper electrode, so that the first end is in communication with, and secured to said top, and the second end is in communication with and secured to the upper electrode and further wherein said first terminal is of sufficient rigidity so that the upper electrode is prevented from rotating during rotation of the adjustable screw rod; and

a second terminal having a first and a second end, said second terminal being positioned between the top of the heating chamber and the lower electrode, so that the first end is in communication with, and secured to the said top, and the second end is in communication with and secured to the lower electrode; and

means for passing a current to said terminals wherby said current is carried to the upper and lower electrodes for the heating of water therebetween.

15. The device of claim 14, further having:

a removable plate being provided in the internal housing, so that removal affords ready access to the electrodes; and

an insulation plate positioned upon and secured to the second terminal, whereby insulation between the upper electrode and the second terminal is provided.

16. The device of claim 13, wherein the upper electrode is further provided with a lid having a hub and a threaded bushing press fitted into said hub positioned for receiving the adjustable screw rod, said upper electrode further having at least one opening through which passes the first terminal, whereby rotation of the first electrode is further hindered during rotation of the screw rod.

17. The device of claim 9, wherein the means for passing the current to the electrodes is comprised of;

a first terminal having a first end and second end, said first terminal being positioned between the top of the housing and the upper electrode wherein the first end is in communication with, and is secured to, the top and further wherein the second end in communication with the upper electrode;

a second terminal having a first and second ends, said second terminal being positioned between the top of the housing and the lower electrode wherein the first end is in communi-

cation with, and is secured to, the top and further wherein the second end is in communication with the lower electrode; and

means for passing a current to said terminals, whereby said current is carried to the upper and lower electrodes for the heating of water therebetween.

18. The device of claim 9, wherein the first valve means is comprised of:

the transverse wall having a first valve aperture for fluid communication between the water receiving chamber and the heating chamber; and

a first adjustment knob positioned in the base of the outer housing, uniaxial of the first valve aperture, and being seated in said base for movement in a first direction towards the first valve aperture, whereby water flow through said aperture is reduced and for movement in a second direction away from the first valve aperture, whereby water flow through said aperture is increased.

19. The device of claim 9, wherein the second valve means is comprised of:

the inner housing having a second valve aperture for fluid communication between the water receiving chamber and the blending chamber; and

a second adjustment knob positioned in the outer housing uniaxial of the second valve aperture, and being seated in said outer housing for movement in a first direction towards the second valve aperture, whereby water flow through said aperture is reduced and for movement in a second direction away from the second valve aperture, whereby water flow through said aperture is increased.

20. An electric water heater comprising:

a hollow outer housing being cylindrical in shape and having a base, continuous sidewall, and upper cover;

an internal housing positioned within the outer housing the area therebetween defining a blending chamber, said internal housing having a transverse wall separating the internal housing into an upper water heating chamber and a lower water receiving chamber disposed above the base of the outer housing, said heating chamber being provided with a lid;

an external pressurized cold water supply source;

a first conduit means having a one-way ball-check valve means connected between the external water supply source and the water receiving chamber, for fluid communication therebetween;

a first valve means having a first valve aperture in the transverse wall for fluid communication between the water receiving chamber and the heating chamber, whereby cold water flows into the heating chamber, and further whereby heated water flows from the heating chamber;

a first valve adjustment means for adjusting the water flow through the first valve means;

a upper electrode being substantially inverted frustroconical in shape and having a skirt, a base, and an electrode lid, wherein said base and said electrode lid each, respectively, have a hub and a threaded bushing, press fitted into said hub, said upper electrode being positioned within the heating chamber and being at least partially disposed in the water therein;

a lower electrode being substantially inverted frustroconical in shape and having a skirt, said lower electrode being positioned within the water heating chamber, nested substantially parallel with respect to the upper electrode, and being at least partially disposed in the water therein;

a first terminal having a first end an second end, said first terminal being positioned between the upper cover and the upper electrode wherein the first end is in communication with, and secured to, the upper cover and further wherein the second end in communication with, and secured to, the first electrode;

a second terminal having a first and a second end, said second terminal being positioned between the upper cover and the second electrode wherein the first end is in communication with, and secured to, the upper cover and further wherein the second end is in communication with, and secured to, the second electrode;

means for passing a current to said electrodes, whereby water in the heating chamber is heated to a predetermined temperature;

an external hot water reservoir, whereby the heated water is stored for use;

a second valve means having a second valve aperture, carried in the internal housing for fluid communication between the water receiving chamber and the blending chamber, whereby water flows from the water chamber to the blending chamber;

a second valve adjustment means for adjusting the water flow through the second valve means;

a second conduit means for fluid communication between the blending chamber and the hot water reservoir, whereby heated water is carried from the blending chamber to the hot water reservoir;

a pressurized air source having a one-way ball-check valve, whereby water is pumped from the water heating chamber through the first valve means, respectively, and into the hot water reservoir; and

a means for synchronizing the operation of the pressurized cold water source and the pressurized air source, whereby the hot water reservoir is maintained at a substantially constant level for use.

21. An electric water heater substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawings.

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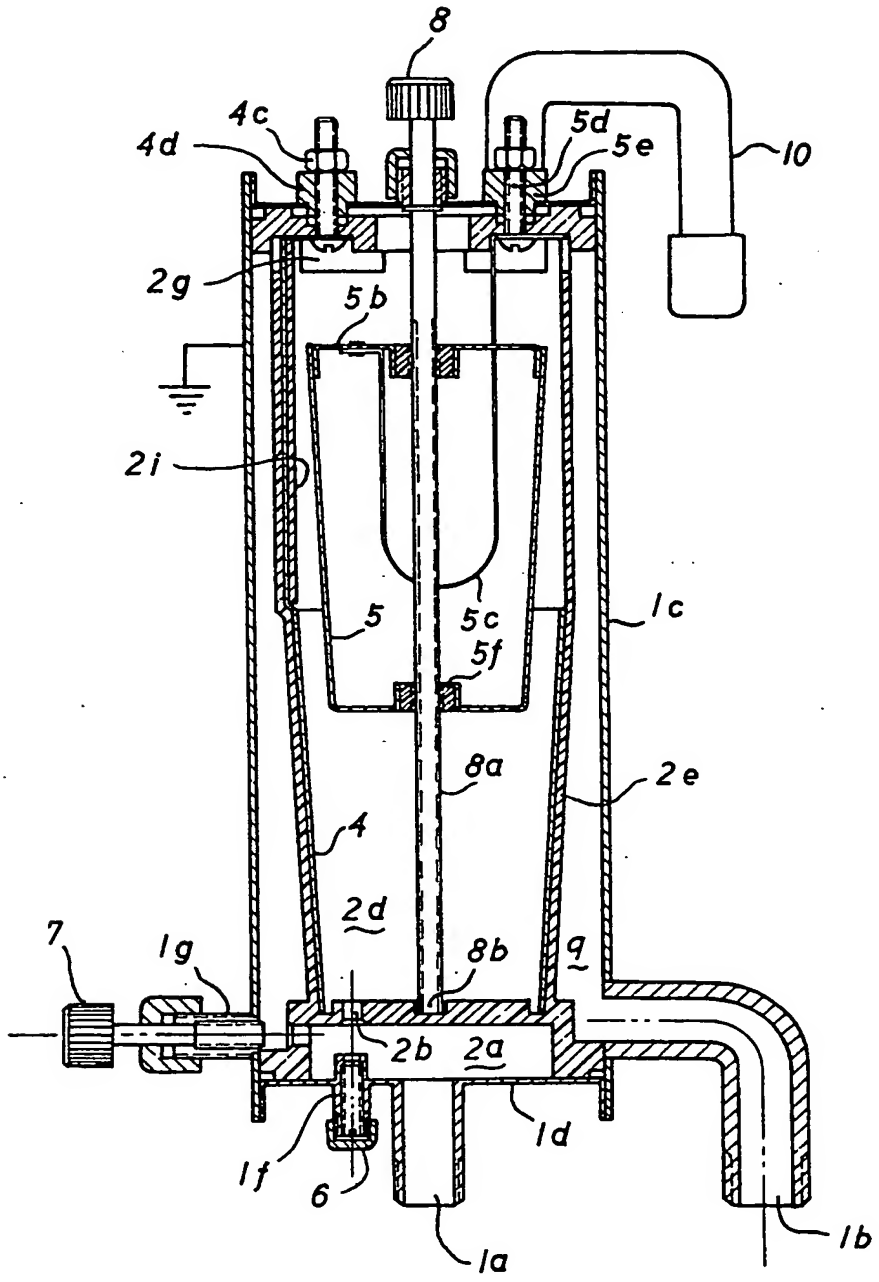

FIG. 2

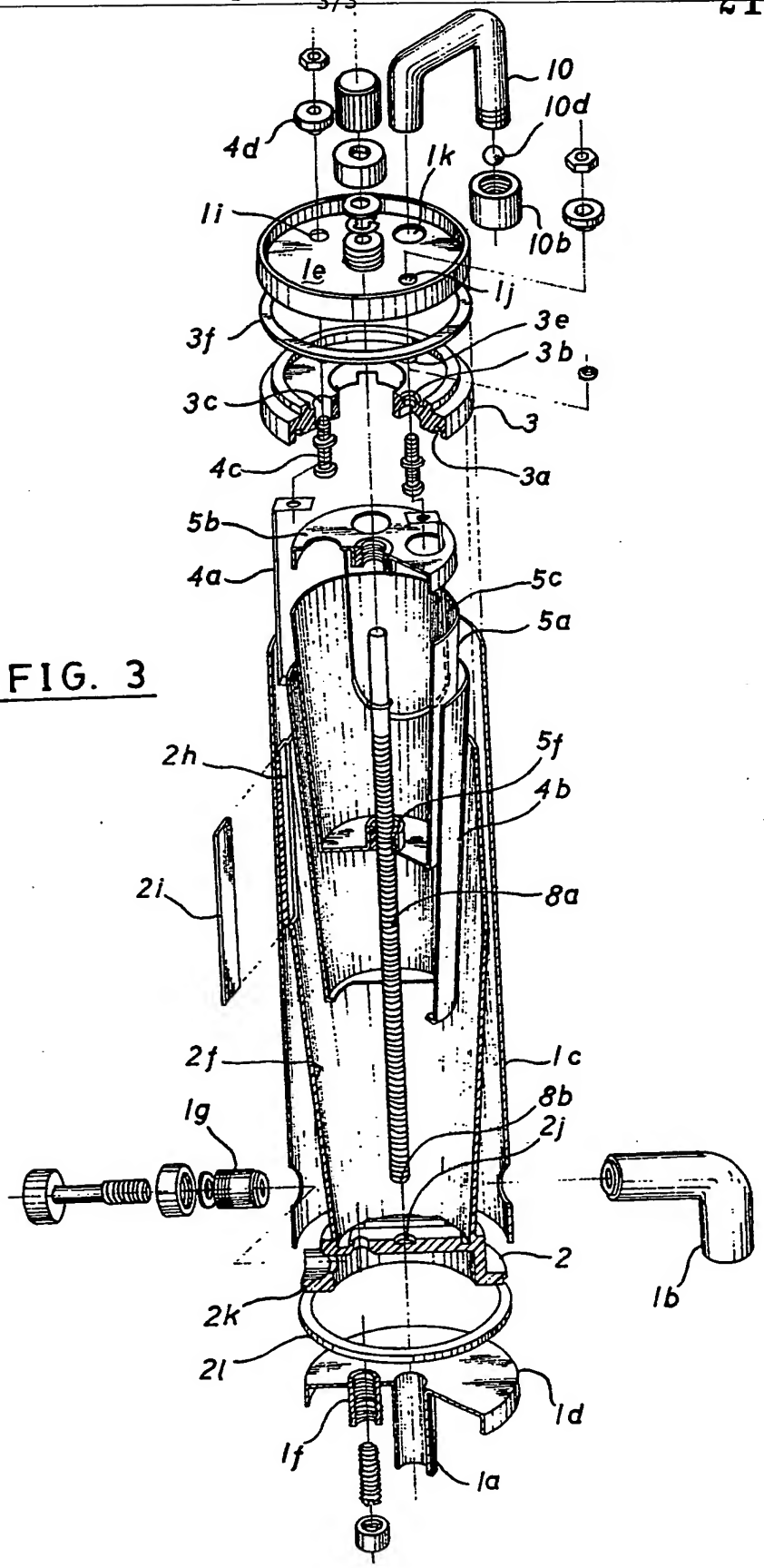

FIG. 3